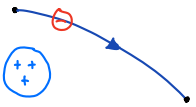
Taylor Larrechea
Dr. Middleton PHYS 132
2-7-17 28.7 HW

Ch 28. CQ's: 3
Probs: 12, 34, 37

Conceptual

28.C.3



$U = \frac{Kq_1q_2}{r}$

a.) The electric potential energy will increase due to the electron getting farther away from the source charge.

b.) The electron's speed at f is less than at i.

Problems

28.P.12

$v = 2.0 \times 10^6$ m/s
$m = 9.11 \times 10^{-31}$ Kg
$q = 1.60 \times 10^{-19}$ C

$U = \frac{Kqq}{r}$ $V = \frac{U}{q}$

$U_0 + \cancel{K_0}^{0} = \cancel{U_1}^{0} + K_1$

$\frac{Kqq}{r} = \frac{1}{2}mv^2$

$2Kqq = rmv^2$

$\frac{2Kqq}{mv^2} = r$

$\frac{2(9.0\times10^9 \frac{Nm^2}{C^2})(1.6\times10^{-19}C)^2}{9.11\times10^{-31}kg(2.0\times10^6 m/s)^2} = r$

$r = 1.2645 \times 10^{-10}$ m

$U = \frac{9.0\times10^9 \frac{Nm^2}{C^2}(1.6\times10^{-19}C)^2}{1.2645\times10^{-10}m}$

$U = 1.822 \times 10^{-18}$ J

$V = \frac{1.822\times10^{-18}J}{1.60\times10^{-19}C}$

$V = 11.4$ J/C

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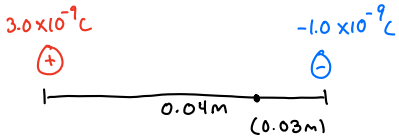
28.P.34



$V = \frac{U}{q}$

$U = 0$ when $r = 0$

$U_V = \frac{Kq}{r}$ $\frac{Kq_1}{r_1} = \frac{Kq_2}{r_2}$

$\frac{3.0\times10^{-9}C}{r_1} = \frac{+1.0\times10^{-9}C}{r_2}$

$\frac{r_2}{r_1} = \frac{+1.0\times10^{-9}C}{3.0\times10^{-9}C}$

$\frac{r_2}{r_1} = +1/3$

$r_1 = 3r_2$

V would be zero at 0.03m

28.P.37

$U_0 + \cancel{K_0}^{0} = \cancel{U_1}^{0} + K_1$

$U = \frac{Kqq}{r}$ $K = \frac{1}{2}mv^2$

$\frac{Kqq}{r} = \frac{1}{2}mv^2$

$\frac{2Kqq}{r} = mv^2$

$v = \sqrt{\frac{2Kqq}{rm}}$

$V = \sqrt{\frac{2(9.0\times10^9 \frac{Nm^2}{C^2})(10\times10^{-9}C)(10\times10^{-9}C)}{0.01m(0.001kg)}}$

V = 0.42 m/s